

**ARC 2491c. Integrated Building Technology I**  
SYLLABUS

**GENERAL COURSE INFORMATION:**

Total Credits: 3  
Prerequisites: Completion of: ARC2490c Introduction to Building Technology  
Class Meetings: Tues – [Lecture] CSE A101 periods 6-7 (12:50 PM - 2:45 PM)  
Thurs – [Labs] ARC 216, 218, 220, periods 4-5 (10:40 AM - 12:35 PM) or  
6-7 (12:50 PM - 2:45 PM)

Instructors: Materials and Methods Module: Weeks 1-5  
Stephen Belton  
Office: 238  
Contact: Canvas Inbox or [sbelton@ufl.edu](mailto:sbelton@ufl.edu)  
Office Hours:

Environmental Design Module: Weeks 6-11  
Dr. Ryan  
Sharston  
Office: 246  
Contact: Canvas Inbox or [r.sharston@ufl.edu](mailto:r.sharston@ufl.edu)  
Office Hours:

Digital Media Module: Weeks 12-16  
Lee-Su Huang  
Office: 240  
Contact: Canvas Inbox or [lee Huang@ufl.edu](mailto:lee Huang@ufl.edu)  
Office Hours:

GTAs: ARC 216 – TBA – contact info + availability outside class TBA  
ARC 218 – TBA – contact info + availability outside class TBA  
ARC 220 – TBA – contact info + availability outside class TBA

**COURSE DESCRIPTION:**

As the second course in a multi-year integrated building technology sequence, there will be an emphasis on further developing components of materials and methods and digital design through two, 5-week modules. Further, a third 5- week module will introduce fundamental aspects of environmental design, with the overarching intent to increase the students' understanding of the impact and/or relationships between context, building technologies, and design decisions.

**COURSE RATIONALE AND PLACEMENT:**

By teaching these topics as a series of inter-related modules with hands-on learning laboratory assignments, students are expected to learn the important technological information associated with each topic, to see sustainable design connections across modules, and to develop a facility in integrating these ideas into their design studio projects.

**COURSE METHODOLOGY:**

This course will cover a range of topics and will be delivered in focused, topical modules.

***Materials and Methods Module (weeks 1-5)***

This module continues the hands-on investigations with materials at a 1:1 scale and the implications of material

decisions on design work. This module will offer an introduction to various material systems, with particular emphasis on mass-based systems, such as concrete and masonry, as well as an initial examination of lattice and/or frameworks.

**Digital Media Module (weeks 6-9, week 10 is spring break)**

This module uses a case study project to introduce students to intermediate techniques of architectural representation using digital methods. The module incorporates vector graphics into the production of architectural drawings in plan and section, as well as the role of architectural diagrams in design representation. The module also covers the basics of 3D architectural visualization via rendering programs, and finally a rendering project that applies a variety of visualization techniques.

**Environmental Technology Module (weeks 11-15)**

Taught in conjunction with the Design 4 studio, Integrated Technology I provides a general introduction to climatology, and passive thermal response with particular emphasis on the context differing climates and locations. The topics of solar geometry, shading devices, and building orientation are covered. The topics of indoor air quality and natural ventilation, and the principles of heat flow and characteristics of thermal mass are introduced.

**Content Delivery:** The modules will be composed of three different methods of content delivery.

- Lectures: Lectures will present the overarching content and issues to the class as a whole. These will be led by module instructors. Student attendance is expected.
- Labs: Lab sessions provide an opportunity to examine, discuss and understand content covered in each module in a more hands-on manner. Specific lab assignments will vary per module.
- Workshops: Workshops consist of brief intensive sessions to study specific topics within a module. Workshops will occur during lab sessions and may include group work, to better facilitate hands-on learning.

**COURSE OBJECTIVES:**

As the second course in a multi-course sequence, this course will build upon the skills and knowledge introduced in ARC 2490c Introduction to Building Technology, advancing the students understanding of fundamental aspects of building material systems and digital design tools, methodologies and means of representation. Further, this course will introduce the fundamental relationship of climate and context in the design process.

- Understand and advance fundamental aspects of building material systems
- Understand and advance the role and relationship of digital design tools to design projects
- Apply digital design methods to targeted design projects
- Understand the spatial and tectonic relationships of design in the digital realm
- Further Develop skills in digital representation methods and output
- Introduce the principles of context, solar orientation, heat gain and thermal comfort

**COURSE TEXTS AND READINGS:**

**Materials and Methods Module:**

Required Text:

[Fundamentals of Building Construction: Materials and Methods](#); Seventh Edition; Edward Allen and Joseph Iano; Wiley; 2019; ISBN 978-1-119-45025-2  
(sixth edition is acceptable, if already purchased from previous semester)

Recommended Texts:

[Building Construction Illustrated](#), 6th Edition; Francis D. K. Ching; Wiley; 2019;  
ISBN 978-1-119-58316-5 (fifth edition is acceptable, if already purchased from previous semester)

[The Architecture Reference & Specification Book](#), Julia McMorrough; Rockport; 2018 ISBN 9781631593796

**Environmental Technology Module:**

Required Text:

Environmental Technology for Architecture, Gold, Siebein, Siebein, Bensalem, Cognella Publishing; 2023. Link to be provided.

Recommended Texts:

[Heating, Cooling, Lighting: Sustainable Design Strategies Towards Net Zero Architecture](#), 5th Edition; Norbert M. Lechner, Patricia Andrasik, ISBN: 978-1-119-58574-9; Wiley; 2021

[The Green Studio Handbook: Environmental Strategies for Schematic Design](#); 3rd Edition; Alison G Kwok, Walter Grondzik; ISBN 9781138652293; Routledge; 2018

[Mechanical and Electrical Equipment for Buildings](#), 13th Edition; Grondzik & Kwok; Wiley; 2019; ISBN 978-1-119-49263-4 (Available online at [UF Library Systems](#))

American Building: The Environmental Forces That Shape It, by James Marston Fitch, William Bobenhausen, Oxford University Press; Revised and Updated edition; 1999

**Digital Media Module:**

Required Text: None; Computer Requirements: Please refer to SoA Computing Requirements on Canvas

**COURSE SCHEDULE & TOPICS (subject to shift):**

	Week	Date	Readings	Class Topic
<b>Materials/ Methods Module</b>	01 MM	1/09+11	Allen/Iano Ch.1+13	Overview, Issues of Mass, Stereotomic Const.
	02 MM	1/16+18	Allen/Iano Ch.14+15	Concrete
	03 MM	1/23+25		Concrete + Masonry
	04 MM	1/30+2/1	Allen/Iano Ch.8+9	Masonry
	05 MM	2/06+08		Masonry + Framework, Space, and Hierarchy
	06 MM	2/15		EXAM Honorlock/Canvas–Open Book+Notes

	Week	Date	Readings	Class Topic
<b>Environmental Technology Module</b>	06 ET	2/13	Cognella module 1&2	Intro to ET + People and Their Senses
	07 ET	2/20+22	Cognella module 3&4	Sun Climate Weather + Thermal Comfort
	08 ET	2/27+29	Cognella module 5&6	Psychrometrics + Heat Flow
	09 ET	3/05+07	Cognella module 7&8	Thermal properties Building Materials + Site planning Natural Systems
	10 ET	3/12		SPRING BREAK NO CLASS
	11 ET	3/19+21	Cognella module 9	Solar Geometry Sun Shading
	Exam			Electronic Test via Honor Lock

	Week	Date	Readings	Class Topic
<b>Digital Media Module</b>	12 DIG	3/26+28		Lumion Basics Importing Geometry and Landscape/City modeling
	13 DIG	4/02		Adv Rhino Modeling: Surfaces, Sweeps, Lofts, Topography
	14 DIG	4/09		PINUP NO CLASS
	15 DIG	4/16+18		Lumion Adv Effects and Styles, Animations
	16 DIG	4/23		GH Intro: Attractor Field Logics, Bitmap Mapping

## **COURSE EVALUATION/GRADING**

Students will be responsible for the material in the reading assignments as well as the course lectures and laboratory sessions. There will be a range of project assignments, and may include both individual and group work. Assignments will ask students to apply knowledge of class material in two potential forms; topic-specific lab assignments relative to direct coursework, and synchronous assignments that complement concurrent, studio-based design projects.

### Material and Methods Module (weeks 1-5):

Assignments will expand the fundamentals of material systems and corresponding impacts to preliminary design and construction logics. Students will be expected to complete specific assignments and/or workshops. This module will include with a summary exam as part of the graded materials. This exam will include terminology, construction/material identification, and other content covered during this module.

### Environmental Technology Module (weeks 6-11):

Environmental Technology assignments will examine how fundamental relationships between of climate, context and design thinking/response through targeted assignments and/or workshops. These assignments include a small project through which the students design and build a mock-up of a shading device and assess its performance using heliodon method. This module will include a summary exam, in addition to assignments. This exam will include terminology, strategies for heat and indoor air quality, and other content covered during this module.

### Digital Media Module (weeks 12-14):

Digital Media assignments will expand on previous digital coursework and focus on further refinement of architectural representation techniques through a series of lab assignments, incorporating complex surface modeling techniques and 3D rendering techniques with applied lighting, environments, and material textures. The module culminates in an architectural rendering project using Lumion for quasi-realistic 3D visualization that applies the techniques covered in the course, but also specifically geographically accurate sun and shadows simulation studies.

Each module will be graded individually. The semester grade will be based on the following breakdown relative to content modules and final project. **To pass the course, the cumulative course grade must be a 60% or better.**

### **Summary Breakdown for Course:**

Attendance + Participation	10% of course grade
Materials/Methods Module:	35% of course grade
Environmental Tech Module:	35% of course grade
<u>Digital Media Module:</u>	<u>20% of course grade</u>
Total:	100%

### Materials/Methods Module (weeks 1-5): 35% of course grade

*Lab assignments – 24% of module grade*

*Concrete Lab Assignment – 8%*

*Masonry Lab Assignment – 8%*

*Framework, Space and Hierarchy Lab Assignment – 8%*

*Summary Exam – 11% of module grade*

### Environmental Technology Module (weeks 6-11): 35% of course grade

*Lab assignments – 18%*

*Psychrometry Lab Assignment – 6%*

*Thermal Comfort Lab Assignment – 6%*

*Solar Geometry Lab Assignment – 6%*

*Solar Shading Project – 17%*

**Digital Media Module (weeks 12-16): 20% of course grade**

Lab assignments – 8%

Surface Modeling Assignment – 4%

Lumion Rendering Assignment – 4%

Digital Animation Project – 12%

**Missing/Late Work**

Specific expectations and assessment criteria will be included as part of each individual assignment in separate handouts. Missing or late work will be graded down at 10% of final assessed grade per day. Work submitted later than 5 days will not be graded. If an assessment is missing or late due to an excused absence (see Attendance section of syllabus), it needs to be completed in a timely manner. Specific submission deadlines will be coordinated by the module instructor.

Please note: Certain laboratory assignments or course experiences may not be able to be replicated and, if missed, will require specific arrangements to be coordinated with module Instructor.

**UF Grading Policy**

Information on UF's grading policy for assigning grade points can be found at the following location: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

**Grading Scale**

Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
Numeric Grade	93-100	90-92	87-89	83-86	80-82	77-79	73-76	70-72	67-69	63-66	60-62	0-59
Quality Points	4.0	3.67	3.33	3.0	2.67	2.33	2.0	1.67	1.33	1.0	0.67	0.0

**ATTENDANCE**

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at:

[www.catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/](http://www.catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/)

Additional details regarding attendance and accommodations are as follows. Attendance for all lectures, labs and/or workshops is mandatory and is recorded. Chronic absences and/or tardiness will have a negative impact on your grade. Tardiness of more than 20 minutes to any lab/lecture will be counted as an unexcused absence. Three or more unexcused absences may result in a full letter-grade reduction in the course. Four unexcused absences can result in failure of the course (see grade breakdown above). Materials covered in the lecture will be tested. If you must miss class, it is your responsibility to notify the instructors in a timely manner, as well as getting the assignments and notes from your classmates.

**SHARED POLICIES:**

**Course Evaluations:**

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at [gatorevals.ua.ufl.edu/students/](http://gatorevals.ua.ufl.edu/students/). Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via [ufl.bluera.com/ufl/](http://ufl.bluera.com/ufl/). Summaries of course evaluation results are available to students at [gatorevals.ua.ufl.edu/public-results/](http://gatorevals.ua.ufl.edu/public-results/).

**Regarding accommodations for students with disabilities**

Students with disabilities requesting accommodations should first register with the University of Florida Disability

Resource Center by providing appropriate documentation (352-392-8565, [www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)). Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

## **Academic Honesty**

Students in the School of Architecture are expected to adhere to all University of Florida academic honesty policies. Failure to do so will result in lowered grades and/or referral to the University Honor Court. Since the University's policies are necessarily generalized, the School of Architecture further clarifies academic honesty within the specific setting of design education. The following acts are considered to be academic dishonesty:

### **1. Plagiarism/misrepresentation**

There shall be no question of what your work is and what someone else's is. This applies to all aspects of student performance, including but not limited to

- CAD drawings and construction details
- design guidelines (written and graphic)
- design, planning, and management projects or portions of projects
- class reports and papers (again, both written and graphic information)
- any assignment where sole authorship is indicated, such as take-home tests, individual projects, etc.

Examples of inappropriate activities include:

- copying graphics for a report without crediting the original source
- representing someone else's work as your own (using existing CAD construction details, tracing drawings, etc.)
- allowing someone else to represent your work as his own

Given the collaborative nature of this course, interaction between students is desirable, but the intention and degree of assistance must be appropriate. For example, it is appropriate to discuss the assignment/method/software program/course materials—but it is not appropriate to solve or resolve a large portion of the project together, unless defined as such in the assignment.

The importance of precedent and learning from past works is a necessary part of most design processes. Again, it is the intent and degree of “borrowing” ideas that is at question.

Anything not original must be paraphrased and cited, or quoted; using accepted style formats such as APA, MLA, Chicago Manual of Style, etc. This includes information obtained from the Internet, public documents, graphics, and personal interviews as well as more traditional written sources. Proper crediting of all information that is not common knowledge is necessary for academic honesty as well as for professionalism. (For example, analysis drawings and/or text should cite the sources from which data was obtained so that if questions arise later, they can be quickly and accurately answered.)

### **2. Multiple submissions of the same or similar work without prior approval**

This course is aligned with design studios with the intent of establishing concurrent lessons between both courses. In noting this, there will be moments when assignments and/or exercises for each class are expected to inform one another. In these instances, if course instructors understand and agree that you are doing an assignment associated with a specific topic, then doing similar work for two different classes is acceptable. It would be inappropriate to submit a single assignment for one class, then later submit the same assignment for another course if the instructors are expecting original work.

### **3. Falsifying information**

Examples include:

- misrepresenting reasons why work cannot be done as requested
- changing or leaving out data, such as manipulating statistics for a research project, or ignoring/hiding inconvenient but vital site information. (However, for educational purposes only, certain aspects of the “real world” may be jointly agreed upon as not being pertinent to the academic goals of the course, such as not dealing with specific project parameters or budget, changing the program, etc.)
- altering work after it has been submitted
- hiding, destroying, or otherwise making materials unavailable (hiding reference materials, not sharing materials with other students, etc.)

## **Counseling + Emergency Contacts**

Police / Fire / Medical Emergency – 911

U Matter, We Care, 294-2273; <http://www.umatter.ufl.edu>

*Sexual Violence: 392-5648 or 392-1111 after hours, confidential reporting*

University Counseling Center, 301 Peabody Hall, 392-1575; <https://counseling.ufl.edu>

University of Florida Student Health Care Center, 392-11671; <https://shcc.ufl.edu>

University of Florida Dean of Students, 392-1261, after hours: 392-1111 (ask for on-call staff); <https://dso.ufl.edu>

Alachua County Victim Services and Rape Crisis Center (24hrs/day); 264-6760

Alachua County Crisis Center (24 hrs/day), 264-6789